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Innovative systems influence on the economic growth of the Volga Federal District of the Russian Federation.

Gabdullin Nail M.[a], Vakhitov Damir. R[b], Zamaletdinov Aidar[c*], Kondratyeva Tatiana N.[d]

[a] *Kazan Federal University, Kazan, 421000, Russian Federatin*
[b] *Russian Academy of Justice (Kazan Branch) , Kazan, 420088, Russian Federation*
[c] *Plekhanov Russian University of Economics (Kazan Institute) ,Kazan, 421000, Russian Federation*
d Novosibirsk State Pedagogical University, Novosibirsk, 630126, Russian Federation

Abstract

In this article we analyzed a correlation between innovative activity of the region and the level of gross regional product. Innovative activity is examined for regions where it has both direct and indirect influence. The purpose of this study is to identify potential opportunities of using innovative activities in the wealth creation process and its impact on the level of gross regional product for Volga Federal District of Russia. Also we considered this activity as a tool to stimulate economic growth and the development of the region. From the majority of indicators that used to characterize innovation sector, we chose and analyzed the main and most important ones: internal expenditures on innovations, number of researchers, and a number of patents. During the study the measures to stimulate innovative sectors have been recognized.

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Keywords: innovations,; human capital; technological capital; gross regional product.

* Corresponding author. Tel.: +7 (965) 601-10-89.
E-mail address: aidar.zamaletd@gmail.com

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1. Problem description.

The increased interest to innovative activity is observed in Russian Federation since the beginning of the economic crisis which began in 2008. It has been realized that the old model of economic growth based on high prices for natural resources brings risks and makes the economy vulnerable to the changes in economic conditions. Innovative activity appears to serve as a new driver of economic growth and sustainable development.

The study of regional innovation systems is essential for analysis of regional economic policy. Regions of the Russian Federation are unevenly developed; there is a strong differentiation in the climatic conditions, mineral resources, the level of economic development, diversified structure of industry and agriculture, different power and innovation capacity and efficiency. This leads to the fact that some regions may develop faster than others, while the simple concentration of resources is not a determinant of economic growth and insufficient for sustainable development.

Regional differences lead to the variability of regional economic policies, due to the fact that some regions are in the process of attracting (adaptation) modern technologies, others are already coming to the exhaustion of the extensive factors of economic growth. Further growth of the regional leaders is possible due the possibility of using their own innovation systems, capable of creating advanced manufacturing processes, producing economic growth.

Changing the model of economic growth leads to a shift of emphasis from a simple growth of gross domestic product to a search for efficient use of resources involved in innovative sector as one of the factors of advanced development [2]. Innovative sector, affecting the final manufacturing process, can serve as a tool to increase the gross regional product. However, it should be noted that the importance of innovative sector grows in the regions, where productivity is already high, and there are no opportunities to increase production by improving the efficiency and effectiveness of production process. It should also be noted that regional differences create differences in sectoral specialization, thanks to the presence of, for example, natural rent or borrowed technologies.

In addition to these, it is extremely important to have the necessary innovation system infrastructure (universities, conducting research; innovative companies interested in the research results, equipment and etc.), as well as the availability of the necessary legal institutions (protection of private property, patent law and competition).

The assessment of the effectiveness of regional innovation systems cannot be based only on the determination of the relationship between the resources involved in innovative sector and gross domestic product. The complexity of the estimation of the index is to measure the volume created by the technological capital which serves as the product of innovative activity and is characterized by high risky investments and a long period of investment returns. The number of issued patents and developed advanced manufacturing technologies can be used as indicators to assess the level of accumulated technological capital in the region.

At the same time, the innovative systems differ considerably from region to region, wherein the difference may be caused by the amount of resources used in this area, and the effectiveness of their use. A common weakness in all regions and the Russian economy is the low efficiency of scientific innovation sector, as well as the lack of interest in the implementation of research results. Because of the export orientation, which appears as the low share of deep-processing products in total exports, the Russian economy extremely vulnerable to external shocks and changes in the world economic situation. The growth of the export potential of the economy cannot be at the expense of borrowed technologies since all of the key features of these technologies have already been implemented or technologies are not available due to the various constraints.

Strategically, this is possible by creating a technological advantage through stimulating innovation. However, the scope of the innovation activities in Russia has a huge number of problems: lack of culture of innovations, scientific cooperation and the working environment when innovations are popular among manufacturers and introduced in mass production.

Development of the regions of the Russian Federation in the short term seems possible using a competitive advantage in advanced industries in the region. Nowadays, the competitiveness of the regions of the Russian Federation is provided by the region's ability to adapt foreign technological achievements and work on each other's markets, reflecting the policy of import products substitution. However, in the nearest future, these capabilities can be exhausted and the further development of regional leaders is possible by creating technology capable to maximize the competitive advantages of the regions. Therefore, it is probable that the regions will be engaged in the

import of institutions promoting innovation activity to solve economic problems and gain competitive advantage.

In working out the development strategy, authorities of the region are to take into account the influence of factors that can be grouped as follows:

1) Non-economic factors - these factors include natural and other ones. For example, climatic changes with both negative effects (drought, flood, poisoning the soil and other negatives) and positive features (ice melting in the Russian Arctic provides opportunities to increase turnover by Northern Sea Route).

2) Global economic factors. These factors include an emission policy and the US Federal Reserve policy (the US dollar - the world currency, has an impact on all currencies of the world), oil prices (Republic of Tatarstan is oil-producing region, whose budget is largely dependent on the oil market), trends of capital movements, labour and intellectual resources in the world and others.

3) Macroeconomic factors. These include the factors and tools under the jurisdiction of the federal government: tax and budget policy, actions of the Central Bank, etc. In this case, the regions have different options to get feedbacks from the federal agencies.

4) Regional factors, in our opinion, include the tools that could be used by a region: regional and local taxes, policies to attract investors, etc.

In terms of attracting more investors it depends on how much effort and money invested in the region's infrastructure, as well as in creating a positive image that is simply advertising its territory. Tatarstan has achieved certain results in the project "Innopolis" (cooperation with the KarnegiMellon University (USA), "SmartSiti" (investors from Malaysia), a free economic zone "Alabuga" (large manufacturers from Turkey, the Czech Republic and other countries). Special attention deserves human potential of the region: the success of the reforms directly depends on the skills and development of the population. Therefore, it is important not only to possess the educational institutions (universities and colleges), but also to provide conditions of work and rest, at which experts will work in the region, rather than seek to leave. Thus, the regional authorities should not only have sufficient resources for economic growth, but also to carry out competent personnel policy, as human resources, in our opinion, is the main factor both in the period of crisis, and during the economic growth. Only the people's initiative can constantly generate new prospects for the region and for the country as a whole.

Based on the foregoing, the regions in their development should be oriented both on the world trends, national economies, and specific for the particular regional factors. It seems reasonable to analyse the economic criteria of the regional development.

2. Description of the model and the object of study.

To investigate the factors affecting regional economic growth, we performed an econometric analysis. As a model we used production function of Sergio Rebelo (Rebelo, 1991) to assess the relationship between technological capital and the growth of gross regional product (GRP) [9]:

$$Y = AK \quad (1)$$

where, A is a positive constant that denotes the level of technology.

K is a capital (including human capital).

In this model, the production depends on the accumulation of capital, regardless, where it has been accumulated. Since diminishing returns on capital are not observed, the accumulation of capital does not lead to slower economic growth. This model refers to a class of endogenous growth models in which the role of scientific and technological progress has been bred out of the model. According to this model the long-term region's economic growth depends on the rate of savings, as well as on policies and institutions that affect the efficiency of resource allocation within the region. At the same time, this model is often criticized because of problems in assessing the level of technological capital or human capital, depending on version of model used.

To assess the level of accumulated capital in our study we analyzed indirect indicators of development of innovative sector as the number of researchers and the costs of research, since these data give an idea of the scale of the development of the innovation system of the region Thus it has been assumed that the number of researchers can have less impact than the cost of research that can be assessed by the number of patents registered in the region.

As an object of investigation we selected one of the leading regions of the Russian Federation - Volga Federal District (VFD), consisting of 14 units, where there is considerable diversity in the degree of development and types of economic activities [10]. Comparative analysis of the Volga Federal District units allowed us to estimate the possibility of these regions in the context of innovative and technological capacity, as well as cost-effectiveness.

VFD regions are extremely heterogeneous; differences in regional development occur primarily due to the differences in the availability of natural resources, as some of the regions receive higher incomes from the sale of resources (Republics of Tatarstan and Bashkortostan, Orenburg region), which have additional resources to develop innovative sectors, specially innovation infrastructure. At the same time in these regions there is a significant lag between the investments and results, due to high investment risks associated with the complexity of the protection of innovation. Actual results of innovative activity in the particular region can be used in another region of Russian Federation or in another country.

At the same time there are differences in innovation systems in the VFD regions that significantly affect the competitiveness of the regions, and ultimately the level of gross regional product (GRP). Due to the fact that the effect of innovation systems is determined by the presence and quality, as well as the interaction between institutions such as science, technology, innovation, and education, differences in the development of these institutions lead to uneven development of the regions of VFD. A more detailed analysis of the differences VFD regions held by us in the next chapter.

3. Findings and Results

Assessment of the scale of research and innovation sector can be based on the number of manpower and financial resources involved - the higher these figures, the better sector is developed in the particular region. At the same time evaluation of efficiency of these resources seems complex, as a result of innovation activity, ultimately should occur in goods and services, the cost of which is reflected at the level of the region's GRP.

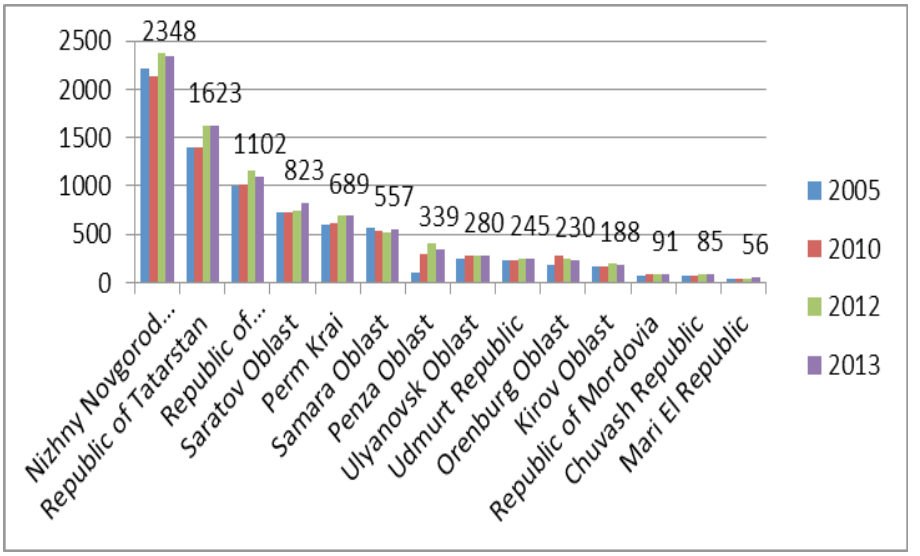
3.1 Assessment of the influence of the number of personnel engaged in research on GRP.

To assess the sector of innovations we have chosen a number of staff with advanced degrees, as it is better appreciates qualitative and quantitative characteristics of the research sector (Fig. 1). According to this indicator the Republic of Tatarstan ranks second, behind of the Nizhny Novgorod region. At the same time if we analyze researchers engaged in scientific research and developments, Tatarstan ranks third, behind the Samara region, whereas in terms of researchers with advanced degrees, this area is ranked sixth (Fig. 1). This indicates about a high proportion of researchers in Samara region, but they are relatively low qualified as compared to other regions of the Volga Federal District.

During the analysed period, there are no significant changes in the scale of the resources involved, for example, the number of researchers with degrees are not reduced or not increased dramatically during the period 2005 - 2013. (Figure 1). Accordingly, it can be assumed that the amount of investment in this sector is not flexible and remains stable for short and medium term.

Fig. 1

Number of researchers with advanced degrees in the Volga Federal District in 2005 - 2013 years. (People)



Done by authors: Regions of Russia. Socioeconomic indicators. 2014: P32 Stat. Sat. / Rosstat. - M., 2014. - p. 706 707 (900).

Ranking VFD entities shows that the Republic of Tatarstan is at the first place, both in terms of gross regional product (GRP), and the gross regional product per capita. It should be noted that in some regions resource rent is influencing the level of GRP and it can be seen in its structure. So, the share of mining industries in the Tatarstan's GRP was 21.3% in 2012, while the mining sector resources are not its major factor of the region's development. The leader of the share of mining resources in GRP is Orenburg region with an index of 37% takes only the sixth place in terms of the GRP after the Nizhny Novgorod region with an index - 0.1%, and Republic of Bashkortostan - 2,9%.

3.2 Assessment of the influence of the level of expenses for research and development on GRP and the number of patents.

Analysis of the impact of internal expenditures on research and development shows little impact on the level of GRP (Figure 2). Also the inverse effect has been revealed, when rich regions can afford to invest in the innovation sector more than the others, and internal costs in these regions include the expenditures on the fundamental research, applied research and development.

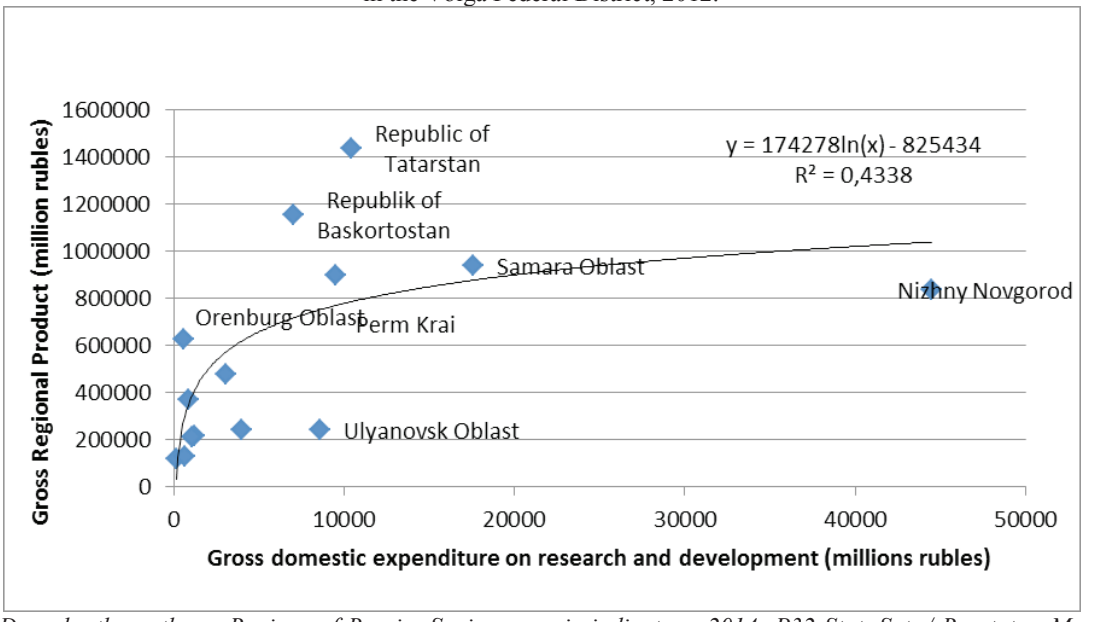
Investigation of the effect of each type of costs shows strong correlation between the expenditures on the fundamental research and GRP and low level between the other two (applied research and development) and GRP. At the same time, there is a strong correlation between the cost of technological innovation and the GRP. During the regional analysis, we had found that in terms of internal expenditures on research and development and components, the leader is Nizhny Novgorod region. In terms of the cost of technological innovation leader is Samara region, the second place takes Nizhny Novgorod region, on the third place is Republic Of Tatarstan.

This indicates that the Samara region is more focused on investments in technological innovation. Technological innovations are made in the latter stages of the innovation process, which are conducted, as a rule, in the companies and can provide more rapid effect. In addition, as Samara region has relatively low-skilled researchers and research scientists without academic degrees, it is to make such type of investments as this is the region more focused on automobile industry (Figure 1).

To evaluate the effectiveness of innovation sector we used a correlation index between internal R&D expenditures to the number of patents granted; we revealed a weak correlation. If we remove from the study the Nizhny Novgorod region, the correlation becomes significant. In our opinion, this suggests that Volga Federal District has non – efficient patenting policies. At the same time the number of patents granted and GRP have strong correlation.

Fig. 2

The impact of domestic expenditures on R&D on the level of GRP
in the Volga Federal District, 2012.



Done by the authors: Regions of Russia. Socioeconomic indicators. 2014: P32 Stat. Sat. / Rosstat. - M., 2014. -p. 347 – 348, 708- 709 (900).

Effect of internal expenditures on the number of developed advanced technology also seems significant. Leader in the number of developed advanced technology is Nizhny Novgorod region; second place occupies Republic of Tatarstan, the third is the Samara region. However, such regions of VFD as Republic of Bashkortostan, the Republic of Mari El, Chuvashia Republic, Kirov region, Orenburg region have not shown any developed advanced production technology.

Investigation of the structure of industrial production leaders in the Volga Federal District shows similar product mix. The next directions are prevailing in the production structure:

1) production of coke and petroleum products, chemicals, manufacturing of rubber and plastic products;

2) manufacturing of machinery, vehicles and equipment.

In these sectors clusters may appear. Effect of innovation activity in the oil and gas sector should go in the direction of deepening refining and improving the diversity of products produced. Leadership Republic of Tatarstan in this sector is very logical, since this region is the oil producing one, and respectively, it is trying to achieve the use of this raw material on its territory. In the industrial structure of the Republic of Bashkortostan the dominance of oil refining is observed, to the detriment of the production of machinery and equipment. The Samara region has the very well developed mechanical engineering sector, as well as the Nizhny Novgorod. This activity has a serious potential for development and export opportunities and efforts in these sectors can be drivers of future growth.

Research of the Volga Federal District regions shows that the most innovative regions are Nizhny Novgorod region, the Republic of Tatarstan, and the Republic of Bashkortostan, while the leaders of the GRP are Republic of Tatarstan, Samara region, the Republic of Bashkortostan. An analysis of the costs of research and development and their impact on the GRP shows weak relationship between these indicators. This may indicate about inefficiency of past costs and possibly current. The reforms in this sector can result politely in the best case after 5-10 years. At the same time there is a strong correlation between expenditures on technological innovations and GRP. These costs are directly correlated with implementation of innovations in the production process, so successful regions learned how to use these resources. However, these costs are associated to a greater extent with adaptation of foreign technologies.

4. Recommendations

Focus on the use of natural rent and borrowed technologies creates limitations for the growth of regional economies, and raising the questions of safety and dependence of the Russian economy. At the same time, having significant innovation systems would not guarantee a high level of development of the region. So, the problems of efficiency of innovation system appears, i.e. the ability to transform the science and education achievements to increase gross regional product, raising the standard of living of the population living in this territory. Weak and inefficient innovation system leads to limited economic growth in the medium and long term.

On the basis of the analysis made we formulated the following measures; the implementation of these steps, in our opinion, will help to increase the competitiveness of the region and in the development of innovative potential of the region.

1) Diversification of the economy. This involves: forming a chain from the extraction of raw materials to the realization high-tech, high value-added products; the development of technology parks and innovation parks to introduce obtained developments in the region. During the launch of innovative product, companies should be focused on the domestic market, and then throughout the Russian Federation and foreign countries.

2) Second, changing the regional policies to provide shift from the economy attracting advanced production facilities to the economy creating innovations:

- improving the quality of scientific, research and educational activities and raising its status;
- creation and supporting economic activities helping to identify potentially supporting export-oriented technologies (startup communities, business angels, venture capital funds);
- supporting creative activities starting from the school age;
- giving preferences to the companies performing creative activities and using the products of such types of activities;
- introducing innovation activity indicators in the regional KPI's to motivate regional authorities.

3) Strengthening of ties between educational, scientific and research institutions and entities:
- developing requirements for graduate students to satisfy the current needs of job market;

- harmonization of research programs and the companies' needs;
- increasing the motivation of graduates, i.e. potential employees, entrepreneurs and supporting their leadership qualities.

In general, the development strategy of the region should be relying on its own resources and the domestic market, with a diversified economy, ability to respond quickly to changing socioeconomic conditions.

It is important to note that without creating a culture of innovation and creativity the innovation activity will not appear. It is necessary to create a population aimed at innovation, ready to accept the risks and failures of innovation activity. Therefore, the innovative component should be implemented at school and become a part of the overall culture of the society. Businesses should support creative activity, creating precedents of successful careers in innovative sectors. Without the creation of necessary institutions and supporting innovations and creative energy of small communities, all the investments in this area will be useless.

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References

1. Awokuse, T. (2003) Is the export-led growth hypothesis valid for Canada? // Canadian Journal of Economics, 36 (1), pp. 126-136.
2. Bilbao-Osorio, & B. Rodríguez-Pose, A. (2004) From R and D to innovation and economic growth in the EU // Growth and Change, 35 (4), pp. 434-455.
3. Bozkurt, C (2015) R&D expenditures and economic growth relationship in Turkey // International Journal of Economics and Financial Issues Volume 5, Issue 1, pp. 188-198
4. Carrincazeaux C. & Gaschet F. (2015) Regional Innovation Systems and Economic Performance: Between Regions and Nations // European Planning Studies Vol. 23, No. 2, pp.2 62–291
5. Dezhina, I. & Kisileva, V. (2007). Troinaja spiral v innovacionoi sisteme Rossii. Voprosi Economiki, pp. 123-135.
6. Doloreux, D. & Parto, S. (2005) Regional innovation systems: Current discourse and unresolved issues// Technology in Society, 27(2), pp. 133–153.
7. Khmeleva, G. (2014). Innovative Processes in Russian Regions: Empirical Studies. // American Journal of Economics and Control Systems Management. Vol. 3, No. 1, 2014
8. Quatraro, F. (2010) Knowledge coherence, variety and economic growth: Manufacturing evidence from Italian regions, Research Policy, 39(10), pp. 1289–1302.
9. Rebelo S. (1991) Long Run Policy Analysis and Long Run Growth //Journal of Political Economy, 1991, vol. 99, no 3, pp. 500-521
10. Regions of Russia. Socio-economic Indicators. 2014: P32 Stat. Digest / Rosstat. - M., 2014. -900p.
11. Zhang, W. (2014) Growth with gender-differentiated human capital and family wealth accumulation based on the Uzawa-Lucas two-sector model // Society and Economy Volume 36, Issue 1, 1 April 2014, Pages 69-94
12. Zhu, D. &Tann, J. (2009) The development of a national innovation system in China: Main practitioners and stages International Journal of Business Innovation and Research //Volume 3, Issue 4, pp. 325-362